

FY07-LXI (61)-158

“Demonstration of WRI’s Pre-Combustion Mercury Removal Process for Lignite-Fired Power Plants”

Submitted by: Western Research Institute

Principal Investigator: Al Bland, Ph.D.

PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
Basin Electric Power Cooperative	\$ 44,000
MDU	\$ 44,000
SaskPower	\$ 44,000
U.S. DOE	\$275,000
NDIC	<u>\$188,000</u>
Total Cost	\$595,000

Project Schedule – 2 years	Project Deliverables:
Contract Date – 9/14/07	Status Reports:
Start Date – 7/1/07	1/31/08 (✓); 4/1/08 (✓);
Completion Date – 6/30/09	10/1/08 (); 4/1/09 ();
	Draft Final Report: 5/31/09 ()
	Final Report: 6/30/09 ()

OBJECTIVE / STATEMENT OF WORK:

Develop and demonstrate pre-combustion mercury removal of raw coal by thermal treatment. A mercury removal efficiency improvement of at least 50% in the incoming coal will be achieved at less than \$30,000/lb of mercury removed. Conduct an economic analysis of the commercial-scale application of the WRI process.

STATUS

Through January 31, 2008

Eight coals have been identified, including North Dakota lignite. The mercury concentrations in the coals vary from 0.0006 ppmw(d) to 0.266 ppmw(d). A bench-scale unit has been upgraded to pre-screen mercury removal characteristics of the selected coals in a fluidized bed dryer. All eight coals have been tested. The findings indicate that the WRI process is amenable to a wide range of low-rank coals. A dedicated sorbent testing facility that can operate at high-temperatures has been designed and constructed. A state-of-the-art mercury analyzer has been procured to measure the vapor phase mercury species. A high temperature (non-carbon) sorbent has been characterized and tested at lab-scale. The findings from the high-temperature sorbent development and testing indicate that WRI process improvements are possible through available high-temperature sorbents. The Process Development Unit (PDU) can handle up to 100 lb/hr of raw fuel and has been operated with the project coals. Tests to date indicate mercury removal levels shown in the bench-scale tests can be achieved in the PDU pilot-scale unit.

Through March 31, 2008

The mercury removal efficiencies obtained in the bench-scale reactor tests were charted. For lignites the removal rates varied between 44 and 90%, whereas for the subbituminous coal the

mercury removal efficiencies varied between 36 and 80%. Also, removal of arsenic and selenium were as high as 67% and 20%, respectively.